Memorandum

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Date: March 16, 2023

To: Kaylie Holland, Alaska Department of Environmental Conservation
Annemieke Powers, Alaska Department of Environmental Conservation

From: Fred Doran, PE, Burns & McDonnell
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Subject: Matanuska-Susitna Borough Central Landfill Revised Leachate Recirculation Development & Demonstration (RD&D) Plan

This memorandum has been developed and updated on behalf of the Matanuska-Susitna Borough (MSB) Central Landfill (Landfill) based on the meeting discussion on May 17, 2022 between MSB and the Alaska Department of Environmental Conservation (DEC), DEC comments on a previous MSB RD&D submittals, and MSB's desire to recirculate leachate in Cells 2B, 3, and 4. This memo is intended to address the DEC's comments, providing an alternate to the previously provided leachate recirculation plan for the Landfill.

In this revised plan, two leachate recirculation laterals (RLs) and one vertical leachate recirculation well (RW) are proposed in the southern end of Cell 3 within the allowed recirculation area, as shown on Figures 1 and 2. Multiple levels of RLs are proposed in Cells 2B and 4 within the allowed recirculation area, oriented generally west to east, as shown in Figure 6. RWs may also be installed in Cells 2B and 4, located at MSB discretion in accordance with the Cell 3 design. Leachate may also be surface applied in Cells 2B, 3, and 4 to the working face before or after Landfill hours.

The Cell 3 RLs and RW and will be designed in accordance with the following parameters, as shown on Figures 3, 4, and 5. Future Cell 2B and 4 RLs and RWs will have similar design constraints.

- RLs will be a minimum of 50 feet from the waste edge or a break in intermediate sideslope, and approximately 50 feet apart from each other.
- Each RL will be sloped to promote leachate distribution through the lateral.
- RLs will be constructed of alternating lengths of 3-inch and 4-inch diameter HDPE pipe, with the 3-inch section engaged into the 4-inch section approximately 5-feet on each side, with a Fernco banded only on the 4-inch pipe. This design allows the pipe flexibility to withstand waste settlement stresses.
- Pipes will be perforated in the field with diameter perforations as indicated in the figures to allow for even leachate distribution through the pipe. Figures 3 and 4 provide the length, slope, and perforated sections of the Cell 3 RLs. Cell 4 perforations will increase in the direction of flow, every 200 feet, from 3/8-inch, to 7/16-inch, to ½-inch diameter, respectively.

- A minimum of 12 inches of intermediate cover soil will be placed on top of the RLs, as shown on Figures 3 and 4. Intermediate cover will be the same soil types as typically used at the Landfill.
- MSB may install additional distribution wings to promote leachate infiltration as shown on the attached Figure 2 for Cell 3 depending on construction cost or material ability. Distribution wings would be constructed of permeable material such as washed aggregate (nominal 1-inch), inert demolition debris (e.g., brick), shredded tires, or crushed glass. Cell 2B and 4 RLs may have similar distribution wings.
- A 3-foot diameter vertical recirculation well will be drilled using a 50-foot vertical borehole backfilled with aggregate as detailed on Figure 5. The vertical recirculation well will allow for loading of leachate through the upper waste layers in Cells 3 and 4. This design takes advantage of the waste's greater horizontal permeability but does not extend to the lower lifts of waste, thereby limiting potential for leachate short-circuiting to the collection system. Cell 2B and 4 RWs would be installed when final intermediate grades are reached in areas with at least 65-feet of waste in place.
- Leachate will be loaded into the Cell 3 RLs/RWs via a vertical injection pipe installed above ground. The injection pipe will have a camlock for ease of operations. Injection pipes will be protected by large concrete blocks placed strategically around the pipe.
- Leachate will be loaded into the Cell 2B and 4 RLs via either a tanker or via a leachate forcemain with RLs branching off. The leachate forcemain will be placed along the eastern crown of Cell 3, parallel to the border of Cell 3 and Cell 4. The RLs will branch off from the forcemain in a northwest to southeast direction. See Figures 6 and 7 for Cell 4 forcemain and RL layout.

The proposed sizing of the Cell 3 RLs/RW and the first lift of Cell 2B/4 RLs is presented in Table 1 and on the figures.

Table 1: Cell 3 and 4 Proposed RLs and RW Design Dimensions[1]

Location	Perforated Pipe Length	Optional Distribution Wings[2]	Vertical Distribution Depth
RL 3-1	190-ft	~5,000 SF	
RL 3-2	190-ft	~5,000 SF	
RW 3-1			43-foot
RL 4-1	500-ft	TBD	
RL 4-2	550-ft	TBD	
RL 4-3	500-ft	TBD	
RL 4-4	450-ft	TBD	
RL 4-5	375-ft	TBD	

1 – Only first lift of Cell 2B/4 RLs provided; subsequent Cell 2B/4 RL lifts and RWs will be designed based on waste filling progress.

2 - Total area for RL 3-1, including distribution wings, is 5,760 square feet. Total area for RL 3-2, including distribution wings, is 5,760 square feet.

TBD – To be determined

The RLs/RWs will be operated as follows:

- Leachate will be delivered to the Cell 3 RLs and RW by an approximately 6,000-gallon tanker. Note that MSB has a 6,000-gallon tanker now but may have different sized tankers in the future. The tanker will be filled at the leachate lagoons, driven to the top of Cell 3, and the RLs/RW will be loaded according to Table 2. RLs will be loaded on the northern side of each RL. These RLs and RW may be connected to and loaded with a forcemain in the future.
- Leachate will be delivered to the Cell 2B/4 RLs and RWs by either an approximately 6,000-gallon tanker or will be pumped into the leachate forcemain from the leachate lagoons southwest of Cell 3. The RLs and RWs will be loaded according to Table 2.
- The forcemain flow rate would be approximately 150 gallons per minute.

Table 2: Cell 3 and 4 Proposed RLs and RW Loading Rates[4]

Location	Loading Rate (Gallons) by Perforated Pipe Length[1]	Loading Rate (Gallons) by Surface Area (with Distribution Wings)[2]	Loading Rate (Gallons) by Vertical Distribution Depth[3]
RL 3-1	4,750-9,500	5,760-20,160	
RL 3-2	4,750-9,500	5,760-20,160	
RL 4-1	12,500-25,000	TBD	
RL 4-2	13,750-27,500	TBD	
RL 4-3	12,500-25,000	TBD	
RL 4-4	11,250-22,500	TBD	
RL 4-5	9,375-18,750	TBD	
RWs			6,000

1 - RLs will be dosed at 25 to 50 gallons/foot of perforated pipe length, according to Reinhart/Townsend*.

2 – If distribution wings are installed, RLs will be dosed at 1.0 to 3.5 gallons/square foot of distribution surface area, according to Reinhart/Townsend. Actual RL loading rates will be determined at the time of construction depending on the final length of the perforated section of the RLs and the inclusion of any wings.

3 - Vertical recirculation wells will be dosed up to 6,000 gallons or refusal, whichever occurs first. This is based on a dosage range of 0.12 to 2.21 gallons/square foot for vertical wells, according to Reinhart/Townsend*.

4 – Only first lift of Cell 2B/4 RLs provided; subsequent Cell 4 RL lifts and RWs will be designed based on waste filling progress.

*Reinhart, Debra R and Timothy G. Townsend, Landfill Bioreactor Design & Operation. Lewis Publishers, 1998.

TBD – To be determined

- For Cell 4 working face application, a 6,000-gallon tanker will be used to distribute leachate from the lagoons onto the waste surface. A forcemain may also be used to deliver leachate to the working face. For the protection of customers and employees, this will occur outside of landfill hours and either subsequent to removal of daily cover at the beginning of the day, or prior to placement of daily cover at the end of the day. Application will not occur during precipitation events nor when weather conditions prevent operation or access. Application will occur to prevent leachate runoff from the waste; application will not occur within 50 feet of the cell's outer sideslopes. In order to limit an increase in waste moisture content between 5- and 10-percent at the working face, the rule of thumb of adding 25 to 50 gallons per ton is used. MSB averages about 160 tons per day which projects to 4,000 to 8,000 gallons per day. This range will be followed for daily working face spray.
- The Landfill Operator will have flexibility on how often to load the RLs/RWs depending on how much leachate is generated, the discharge capability of the tanker, and the loading rate of the RLs/RW. At a minimum, each RL should be rested for one day between

loadings. An RW may be loaded if the leachate level in the pipe is below 6-feet beneath the waste surface. MSB staff will measure the depth to leachate in the RW risers using a depth to water measuring device. During a loading event, a flow meter or tanker water level indicator will be used to determine whether leachate is flowing into the riser and a valve will be used to control the flow. When leachate is no longer flowing into the riser during a loading event, the valve will be closed and loading will stop for that day.

- Whichever leachate recirculation method is used, the volume of leachate loaded will be recorded.
- Recirculation will not occur if conditions exist that would limit delivery of leachate to the trench including odor migration off property, a reduced percolation rate (as indicated by leachate level in the riser pipe), leachate breakouts, staffing issues, and inoperable equipment. A contingency flow chart is provided if leachate seeps occur.
- If available, one-foot of shredded wood waste will be placed on top of the intermediate cover over the RLs and around the RW perimeter to mitigate potential odor.

The RLs/RW will be monitored as follows (see attached Recirculation Record Log):

- If a riser is available, leachate level in RWs will be monitored in the riser pipe before each loading event. Operation will be in accordance with the loading rates in Table 2, with each RL/RW rested a day between loadings.
- If a forcemain and pumping system is used to direct leachate from the lagoons to the RLs, a control panel with flow meter and timer will be used to operate the system and record flow and volume data.
- RL/RW and working face areas will be monitored for seeps and odors before each loading event.
- Waste settlement will be visually monitored before each loading event over and around each RL or RW, looking for surface depressions or low spots that may have developed. Additionally, a piece of tape or other marking will be placed on the riser where the pipe meets the intermediate cover at the time of construction. Then, prior to each loading event, distance from the tape to the top of soil will be measured to see if settlement has occurred.
- Monthly when recirculation is occurring, a Solid Waste staff member will walk the perimeter road along the northern boundary of Cells 2A. If an odor is detected, the adjacent neighborhood to the north (Leeann Drive and Loma Rica Drive) will be monitored. If an odor is not detected in the adjacent neighborhood, recirculation may continue. If an odor is detected in the neighborhood, MSB staff will investigate potential sources (e.g., landfill gas, working face, leachate lagoons). If the source is determined to be due to recirculation, MSB will suspend recirculation to complete mitigation measures such as landfill gas system adjustments or additional daily or intermediate cover, including use of wood chips. Recirculation can resume when odors are mitigated. If possible, the primary work location

of the person completing the inspection will not be the Landfill. If such a person is not available, an employee whose primary work location is not the working face or active portion of the Landfill will perform the odor monitoring. Observations will be recorded on the MSB Leachate Recirculation Record Log regardless of whether an odor is detected.

Should you have any questions or need additional information, please feel free to contact Fred Doran at 952-290-6334 or fdoran@burnsmcd.com.

FJD

Enclosure:
Attachment A: MSB Recirculation Record Log, Contingency Flow Chart

cc: Brett Olson, MSB
Jeff Smith, MSB
Ed Lohr, MSB